In these experiments it was assumed that 1 gramme of urea contains 372 c.c. nitrogen, measured at 0° C. and 760 mm. barometric pressure; or, that each c. c. of nitrogen evolved, measured under the conditions stated, represented .002688 gramme urea.

During these investigations it was observed, in cases in which the whole of the nitrogen was not evolved, that so long as the conditions remained the same, the relative proportion of the nitrogen eliminated was pretty uniform. Hence, if the volume of nitrogen evolved from a known quantity of urea under certain conditions, or by a given form of apparatus, be determined, the result may be taken as the basis for the determination of the urea in the urine with sufficient accuracy for clinical purposes.

ARTICLE X.

ANÆSTHESIA OF THE CORNEA AND ITS SIGNIFICANCE IN CERTAIN FORMS OF EYE DISEASE

By JAS. L. MINOR, M.D., Assistant Surgeon to the New York Eye and Ear Infirmary.

FOR several years past, Dr. Noyes has been in the habit of testing the sensation of the cornea in many diseases of the eye, and the following cases, occurring in his practice, will serve to illustrate a class in which anæsthesia was found. Such cases are by no means infrequent—all ophthalmologists are familiar with them; but, taken singly, as they usually occur, one is apt to be struck only with their obstinate character, whereas, collectively, a group of symptoms is presented, which clearly places them in a class peculiar to themselves—and thus by calling attention to their existence, it is hoped that closer observation will lead to a better understanding concerning them. Brief histories of the cases will be given, after which the peculiar features will be pointed out, and the deductions to be drawn therefrom presented. The test of the degree of corneal sensibility was to touch the surface with a pledget of cotton rolled to a point, or with a fine brush, and comparison was always made with the other eye. In all cases quoted there was decided difference in the tolerance of the two eyes. The diseased one might be conscious of being touched, but its sense of feeling was manifestly blunted.

CASE I.—A male, 35 years old, robust and healthy, has suffered for several months with a cold in his left eye, which has resisted all treatment. Pain has been present, frequently severe, usually in the eye, but occasionally in the supra-orbital region, and twice involving the whole left side of the face. Present condition, conjunctivitis:[1] maceration of the epithelial layer of the cornea, with small facets at its periphery; anæsthesia of both the cornea and conjunctiva. Amongst the remedies used may be mentioned the various astringents, atropia, cold applications, hot fomentations, corneal paracenteses, protective bandage, hypodermic injections of pilocarpine, Turkish baths, quinia, arsenic, etc. After remaining under treatment for four weeks, the patient passed from observation with very little improvement in his condition. The patient had a carious and painful left molar, the removal of which did not influence the eye disease.

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[1] The term conjunctivitis, as used with these cases, is not strictly correct. The condition is one of vascular paralysis, distinct from, but associated with inflammation.

CASE II.—A female, 27 years old, has been subject to colds in the eye for the past year. The present attack commenced several weeks ago, and for the last two days pain in and around the eye has been distressing. Present condition, conjunctivitis; keratitis; and extensive erosion of the epithelial layer of the cornea; anæsthesia of the cornea; tension of globe reduced; no iritis, but a contracted pupil, which responds imperfectly to atropia. She was treated for a period of nearly five weeks, both locally and generally, with but moderate improvement. The epithelial layer of the cornea has been regenerated. The sensation is still diminished, but not so markedly as when first seen.

CASE III.—A robust and healthy man, 60 years of age, has had a cold in the right eye for nearly three weeks, and for the last few days severe pain in the right side of the face and head. Present condition, conjunctivitis; erosion of the corneal epithelium at its inner margin; anæsthesia of the cornea and conjunctiva; no iritis, but a contracted and sluggish pupil; tension of the globe reduced. There is partial anæsthesia of the parts supplied by the right fifth nerve. Local treatment proved rather irritating than otherwise, and general remedies were unsatisfactory, until, at the expiration of three weeks' treatment, the fluid extract of gelsemium was administered. Under its influence the pain disappeared, the inflammation subsided, and sensation returned. Morphia in large doses had failed to relieve the distressing pain. The pain, though nearly always present, was much exaggerated between the hours of two and five A. M., which led to a suspicion of malaria. Quinia did not relieve.

CASE IV.—A male, 48 years old, had two months ago an attack of right facial neuralgia, with swelling of that side of the face. As this condition subsided (in five or six days), the right eye became inflamed, which inflammation, soon passing away, left the sight impaired. Several relapses were experienced. Present condition, conjunctivitis; keratitis; anæsthesia of the cornea and conjunctiva; sensation of the right side of the face diminished. The treatment was both local and general. The course was tedious and prolonged. This patient had seven carious tooth-roots, the removal of which did not influence the disease.

CASE V.—A male, aged 57, brings a note from his family physician stating that he has recently suffered from an attack of facial erysipelas, limited to the left side of the face. The left eye was slightly inflamed before the erysipelas was experienced, and became much worse during its existence. The erysipelas (which was really an attack of herpes zoster ophthalmicus) has subsided, leaving the eye inflamed and painful, with neuralgia of the adjacent nerves. Present condition, conjunctivitis; slight keratitis; anæsthesia of the cornea and conjunctiva; a small and sluggish pupil (non-inflammatory); the globe reduced in tension; dimin-

The sodden appearance, with enlarged and tortuous vessels coursing along the conjunctival surface, presents a characteristic condition, and is quite different from the velvety swelling seen in pure conjunctivitis.

ished sensation, with a feeling of numbness in the parts supplied by the left fifth nerve. On the left side of the nose and forehead herpetic scars, some of which have not entirely healed, are observed. Recovery slow; local treatment unsatisfactory. Quinia was apparently beneficial; fluid extract of gelsemium relieved the pain, and under its influence sensation slowly returned, and the inflammatory symptoms subsided.

Case VI.—A male, aged 25, suffering from conjunctivitis and anæsthesia of the cornea, received local treatment for four days without benefit, when it was found that he suffered from supra-orbital neuralgia, with tenderness of that nerve, and furnished a history of malarial poisoning. He was immediately placed on large doses of quinia, and reported himself in two days as about cured; sensation in the cornea having returned.

Case VII.—A male, 30 years old, has ulcerative keratitis, an anæsthetic cornea, with neuralgia and tenderness of the supra-orbital nerve, and a history of malarial poisoning. The treatment was paracentesis of the cornea, atropia, boracic acid solution, protective bandage, and large doses of quinia. Two days later he was much better, and on the fifth day after he was first seen he was allowed to return home about cured; the cornea having regained its sensibility.

Case VIII.—A male, aged 17, has conjunctivitis in the left eye, with minute corneal opacities, anæsthesia of the cornea, supra-orbital neuralgia and tenderness, with a malarial history. The ordinary local treatment was adopted, and large doses of quinia administered. The patient was not again seen for several weeks, when he voluntarily stated that improvement commenced as soon as "buzzing in the ears" was noticed. The cornea is sensitive; the conjunctivitis has nearly disappeared, and no trouble exists with the supra-orbital nerve.

Case IX.—A male, aged 28, has conjunctivitis of a week's standing; the conjunctiva and cornea are both anæsthetic. The pupil is small and sluggish (non-inflammatory). There is neuralgia and tenderness of the supra-orbital nerve. Improvement commenced and continued under the influence of quinia, and simple local remedies.

Case X.—A male, aged 35, has been subject to attacks of sore eyes for the past nine years. The first occurred in 1871, the second in 1876, the third in 1879, the last and final one in 1880. This attack commenced a week before he was seen, and was preceded by a well-marked chill. Severe facial neuralgia on the same side remained after the chill passed off, and was present when seen, as also was tenderness of the supra- and infra-orbital branches of the fifth nerve. The conjunctiva was inflamed; the cornea nebulous from previous inflammation, and anæsthetic. Pupil small and sluggish, but iris not inflamed. Local treatment was adopted, and quinia administered. He was seen four days later, and was then found to be much better. Unfortunately he was not seen again.

I think that we are justified in placing these cases in the category of neuro-paralytic affections, and in locating the lesion upon which they depend frequently in the Gasserian ganglion. The lesion may be more or less circumscribed, involving fibres of the sensitive, vaso-motor, and trophic varieties, whose destination is the eye; or, it may invade a more extensive territory, viz., an entire branch of the trifacial, or the trunk itself.

Anæsthesia of the cornea existed in every case. It was found in the conjunctiva in five cases; and partial anæsthesia of the corresponding fifth nerve presented itself in three cases.

Anæsthesia of the cornea was only one factor, and did not in these cases bear any special relation to either the severity of the attack, or the inflammation which frequently existed in this structure. Anæsthesia of the cornea existed in six cases without keratitis ; and in those cases that presented both anæsthesia and inflammation, complete protection of the eye did not materially alter the course of the disease. It may be mentioned that two classes of corneal anæsthesia have been excluded. First, those in which the anæsthesia is dependent upon inflammatory swelling of the conjunctival and corneal tissues, whereby the nerve-fibres are compressed, and their functions impaired or destroyed ; second, the well-marked cases of neuro-paralytic ophthalmia which accompany complete paralysis of the fifth, and in which the corneal anæsthesia is complete, and is associated with central trophic lesions.

Vaso-motor disturbance was shown by paralysis of the bloodvessels of the conjunctiva and iris. Dilatation of the vessels of the iris is sufficient to maintain an obstinately contracted pupil, and to enable the iris to withstand remarkably the influence of atropia employed in full doses : and that too when no pupillary adhesions or exudations existed.

Trophic changes manifested themselves through a disturbance in the nutrition of certain structures of the eye (conjunctivitis, infiltration, inflammation, and ulceration of the cornea, etc.), due to central nervous lesions.

Diminished tension of the globe was noted in three cases. It is not stated as having been increased in any—and was probably more frequently present. This reduction may have been due to either mechanical or neurotic influences. The character of the neuralgia indicated both its connection with the eye trouble and its central origin.

In locating the primary lesion in the Gasserian ganglion, pathological deductions are drawn from physiological experiments.

> "The Gasserian ganglion forms a flattened crescentic mass of gray matter mingled with the fibres derived from the sensitive root (of the fifth). According to Kölliker the fibres of the sensitive root simply pass through the gray matter of the ganglion, making no anatomical connections with its nerve cells, while the ganglion cells, which are unipolar in form, give off fibres in a peripheral direction. Thus the branches of the fifth nerve beyond the ganglion contain, besides the fibres of the sensitive root, others, which have their origin from the ganglion itself. . . . . If the fifth nerve be divided within the cranium by a section passing in front of or through the Gasserian ganglion, a change of nutrition often follows in the cornea, by which its tissue becomes the seat of vascular congestion and ulceration . . . immediately after the operation, the pupil is contracted, and the conjunctiva loses its sensibility. . . Although these consequences usually follow division of the fifth nerve when performed at the seat of the Gasserian ganglion, or between it and the eyeball, they are either retarded in their appearance or altogether wanting when the section is made posterior to the ganglion, between it and the base of the brain." (Dalton.)

It is a fact that the fifth nerve does receive sympathetic fibres, before and after its passage through the Gasserian ganglion, and that implication of these fibres and of the ophthalmic ganglion may induce nutritive and other changes in the eye. Under such circumstances, however, the manifestations will be more restricted and less constant than those dependent upon lesions in the Gasserian ganglion, and such as were presented by some of the above related cases.

It is interesting to observe the similarity which exists in all of these cases. Case V. was a typical one of herpes ophthalmicus. Case IV. was probably the same disease. The intimate pathological relation between all of these cases is forcibly suggested. Another interesting fact is that the last five cases presented supra-orbital neuralgia, with tenderness of this nerve, and histories of malarial poisoning. These cases were cured of all of their maladies by the energetic use of quinia. Cases I. and IV. had carious teeth, the removal of which did not benefit the condition of the eyes.

In regard to the *diagnosis*, the symptoms presented are sufficiently distinctive. The only point that it is important to observe is the etiological relation that malaria bears to many cases. With neuralgia and tenderness of the supra-orbital or other branches of the fifth pair, and a malarial history, we are justified in diagnosticating "malarial" conjunctivitis, or keratitis.

The *prognosis* is rather conjectural than otherwise in these cases not malarial. The duration may be roughly stated as from two to six weeks, and relapses are to be anticipated. If malarial, the prognosis is favourable, and a cure may be effected in a few days.

Local treatment proves of little benefit. Hot fomentations are usually pleasant and grateful to the patient. Weak astringents, or boracic acid, are sometimes well borne. Keratitis or iritis would, of course, call for atropia. The iris, however, manifests little reaction to atropia, whether inflamed or not. Paracentesis of the cornea does not seem beneficial; a protective and pressure bandage is indicated if ulceration is present, otherwise it is not important. Of anodynes, which are invariably called for, gelsemium is certainly the best; and following the views of Dr. Prout, of Brooklyn, I prefer to combine it with morphia, with an idea of lessening the dose, and producing a more beneficial effect than either given separately would produce. In malarial cases quinia should be freely administered until cinchonism is produced. In a case not related here in which suppurative keratitis was accompanied with severe pain, both in the eye and distribution of the supra-orbital nerve, twenty grains of quinia three times a day relieved the pain and caused a subsidence of the inflammation. If improvement does not ensue after using it for three days, it will be unnecessary to pursue that treatment longer. Among the remedies which might have been used in the less successful cases is the constant current of electricity.

Gelsemium is not a new remedy in ophthalmic practice. The late Dr. Hildreth, of Chicago, himself a victim to a fatal overdose of the drug, employed it extensively in his eye practice. Galezowski, of Paris, now advises its use, and has found it a valuable addition to ophthalmic medicine. The beneficial action of gelsemium in affections of the fifth nerve is a well-attested fact, and this action will account for the improvement which followed its administration in these cases. The best form is the fluid extract, and this should be a reliable preparation (Squibb's). The dose should be sufficient to produce and maintain its physiological effect to a very moderate degree. Commencing with five drops every two or three hours, the dose may be continually increased as the system becomes less susceptible to its influence; a sixteenth or an eighth of a grain of morphia much enhances its action. It is well to remember that the drug should be given with care, and its effects assiduously watched; a cumulative effect is sometimes observed, when alarming symptoms supervene upon the use of small doses which have been kept up for a considerable time. Were it not that malaria has heretofore been charged with producing just such affections as have been related, one might have some reluctance in bringing forward that agent for renewed etiological honours; and in referring the primary lesion, in these cases, to a neurotic disturbance, we but follow the views adopted by previous observers.

ARTICLE XI.

RETENTION OF THE MENSES, CAUSED BY IMPERFORATE HYMEN. REPORT OF TWO CASES WITH SOME REMARKS. By LOUIS W. ATLEE, of Philadelphia.

MARY P., sixteen years of age, tall and thin, but with no appearance of ill-health, was brought by her mother to my father's office May 17, 1881. She resided in a healthy place near the city, and worked in a woollen mill, which she said was well ventilated and not dusty.

She urgently demanded relief from unbearable pains in the lower part of the belly, attended by frequent inclination to pass water, which at times was very difficult to accomplish, and an almost constant desire to empty the lower bowel, in fact she had to be shown the privy almost as soon as she entered the office. This condition of things had begun some months before; it was getting worse, and every few weeks for a period of four or five days it was aggravated very much. When asked, her mother said her daughter had never had any show of monthly sickness, or sign of bloody discharge.

This case of amenorrhœa was attended by symptoms so special as to call for a direct examination of the genital organs in order to find out if some